

ABSTRACT OF THE DISCLOSURE

[00109] A system and method for measuring defects, film thickness, contamination, particles and height of a thin film disk or a silicon wafer having a first electromagnetic signal source for generating a first signal toward a first position on the thin film magnetic disk or a silicon wafer at a first angle, a second electromagnetic signal source for generating a second signal toward the first position on the thin film magnetic disk at a second angle, a spinning device for rotating the object to change the first position, a first position sensitive detector to receive a portion of said first signal that reflects off of the object, and to determine a radial portion of the first signal (S1r) and a circumferential portion of said first signal (S1c), a second position sensitive detector positioned at a right angle from the first position sensitive detector, to receive a reflected portion of the second signal that reflects off of the object, and to determine a radial portion of the second signal (S2r) and a circumferential portion of the second signal (S2c). Simultaneous with the measurement of the radial portion of the first signal is the measurement of the phase shift of the first signal. A second set of detectors positioned at a right angle from the first position sensitive detector measures the phase shift of the second signal. The system also includes a processor for determining the height of the first position based upon a difference between S2c and S1c that does not include slope information. In addition to measuring the height the system can measure film thickness and defects through the measurement of the phase shift of the optical signals. An optical profilometer is described which can measure topography on thin film disks, optical substrates or silicon wafers and whose output is independent of the reflectivity of the substrate. This material independent optical profilometer uses a retro-reflector to achieve

reflectivity independence and to increase the height sensitivity to 8 times the height of the surface. The reflectivity independent optical profilometer achieves perfect cancellation of the slope of the surface while measuring the topography of the substrate.